

WE CLAIM:

1. A buffering system for use with a wafer processing system comprising:
 - a frame;
 - a first input/output (I/O) station for loading and unloading wafer carriers, each wafer carrier being configured for holding a plurality of wafers;
 - a wheel, the wheel including a plurality of shelves, each shelf configured for supporting one of the wafer carriers, the wheel being supported for rotation on the frame about a generally horizontal axis;
 - a drive mechanism that is configured to rotate the wheel about the generally horizontal axis; and
 - a wafer carrier port that is communication with a wafer handling chamber.
2. The buffering system of claim 1, further comprising a wafer carrier transfer mechanism that is configured to transfer the wafer carriers between the I/O station and the shelves.
3. The buffering system of claim 2, wherein the wafer carrier transfer mechanism comprises a shuttle that includes a support positioned on a horizontal track.
4. The buffering system as in claim 3, wherein the support can pivot about a vertical axis with respect to the wafer carrier port.
5. The buffering system of claim 3, wherein the wafer carrier transfer mechanism is also configured to transfer the wafer carriers between the shelves and the wafer carrier port.
6. The buffering system of claim 3, wherein the wafer carriers are transferred from the shelves by positioning the support under the shelves to interfere with the rotation of the wafer carrier on the wheel.
7. The buffering system of claim 3, wherein the wafer carriers are transferred to the shelves by positioning the support with a wafer carrier above a shelf to interfere with the rotation of the shelf on the wheel.
8. The buffering system of claim 1, wherein the wafer carriers provide a substantially closed environment for a plurality of wafers positioned within the wafer carrier.
9. The buffering system of claim 8, wherein the wafer carriers are standard front opening unified pods.

10. The buffering system of claim 1, wherein the wafer carriers are open and the frame defines a substantially closed environment.

11. The buffering system of claim 1, wherein each shelf is configured to rotate as the wheel rotates about the generally horizontal axis.

12. The buffering system of claim 1, wherein the wafer carriers hang from the shelves.

13. The buffering system of claim 1, further comprising a second I/O station for loading and unloading wafer carriers.

14. The buffering system of claim 1, wherein the first I/O station is configured to receive a wafer carrier from an overhead hoist transport system.

15. The buffering system of claim 1, wherein the first I/O station is configured to such that a wafer carrier can be loaded directly onto the shelves.

16. The buffering system of claim 1, further comprising a second wafer carrier port.

17. The buffering system of claim 16, wherein the second wafer carrier port is located generally above the first wafer carrier port.

18. The buffering system of claim 17, further comprising a first wafer carrier transfer mechanism that is configured to transfer the wafer carriers between the shelves and the first wafer carrier port and a second wafer carrier transfer mechanism that is configured to transfer the wafer carriers between the shelves and the second wafer carrier port.

19. The buffering system of claim 17, further comprising a wafer carrier transfer mechanism that includes an elevator and is configured to transfer the wafer carriers between the shelves and the first and second wafer carrier ports.

20. The buffering system of claim 1, further comprising a wafer handling chamber that is in communication with the wafer carrier port.

21. The buffering system of claim 20, wherein the wafer handling chamber includes a wafer handling robot that is configured to move wafers in and out of a wafer carrier through the wafer carrier port.

22. The buffering system of claim 20, wherein the wafer handling robot is also configured to move wafers in an out of a processing system that is also in communication with the wafer handling chamber.

23. The buffering system of claim 20, wherein at least a portion of the wafer handling chamber is positioned within the frame such that the shelves rotate around at least a portion of the wafer handling chamber.

24. A buffering system for use with a wafer processing system, comprising:
a frame located substantially above the wafer processing system;
an input/output (I/O) station for loading and unloading wafer carriers that are configured for holding a plurality of wafers;
a wheel, including a plurality of shelves for supporting the wafer carriers, the wheel being supported for rotation on said frame about a generally vertical axis; and
a drive mechanism that is configured to rotate the wheel about the generally vertical axis; and
a wafer carrier port that is communication with a wafer handling chamber.

25. The buffering system of claim 20, comprising a plurality of stacked wheels, each of the wheels including a plurality of shelves for supporting the wafer carriers.

26. A buffering system for use with a wafer processing system, comprising a frame and a wheel, said wheel supporting a plurality of wafer carriers, said wheel being supported by said frame for rotation about a generally horizontal axis.

27. The buffering system of claim 26, further including a first door for transporting said plurality of wafers into said buffering system, a second door located between said wafer buffering system and said processing system, and a shuttle for transporting wafers from said first door to said second door.

28. A buffering system for use with a wafer processing system, comprising a frame and a wheel, said wheel including plurality of positions for supporting a plurality of wafer carriers, said wheel being supported for rotation about a generally vertical axis and being located above the wafer processing system.

29. A method for providing wafers to a wafer processing system, comprising:

loading a wafer carrier onto an input/output (I/O) station of a buffering system;

transferring the wafer carrier to one of a plurality of shelves positioned on a wheel for rotation about a generally horizontal axis;

rotating the wafer carrier about the generally horizontal axis;

transferring the wafer carrier from the one of a plurality of shelves to a wafer carrier port;

removing a wafer through the wafer carrier port; and

transferring the wafer to a processing chamber.

30. The method of claim 29, wherein transferring the wafer carrier to one of the plurality of shelves comprises positioning a support of a shuttle under one of the shelves to interfere with the rotation of the one of the shelves about the generally horizontal axis.

31. The method as in claim 29, wherein transferring the wafer carrier from the one of a plurality of shelves comprises positioning a support of a shuttle above one of the shelves with the wafer carrier to interfere with the rotation of the shelf on the wheel.

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